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Model Independent Analysis of the Proton Magnetic Radius JOYDEEP ROY, Wayne State Univ — The Proton is a fundamental constituent of matter. In contrast to other fundamental particles like the electron, it is an extended object and has a finite size that can be inferred with some degree of accuracy from several measurements. The electric radius can be extracted from electron-proton scattering experiments,($r_E^p = 0.871 \pm 0.009$ fm) and Lamb shift in Muonic Hydrogen($r_E^p = 0.84184 \pm 0.0006$ fm). The reason of this discrepancy between these values is still unknown and an open issue till date. In the literature there also exist several values of the proton magnetic radius extracted using several model-dependent methods. We use constraints from the analytic behavior of form factors to determine the proton magnetic radius in a model-independent way. Using existing datasets of electron-proton scattering we find $r_M^p = 0.91^{+0.03}_{-0.06} \pm 0.02$ fm. When we include electron-neutron scattering data and $\pi\pi \to N\overline{N}$ data, we find $r_M^p = 0.87^{+0.04}_{-0.05} \pm 0.01$ fm and $r_M^p = 0.87^{+0.02}_{-0.02}$ fm respectively. We also extracted the neutron magnetic radius as $r_M^n = 0.89^{+0.03}_{-0.03}$ fm combining all three datasets.

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